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The use of conifer needles to monitor atmospheric semi-volatile organic compounds in Sequoia National Park

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Abstract

An analytical method, required to reduce matrix interferences from lipids and waxes while maximizing recovery of target analytes, was developed to extract semi-volatile organic compounds (SOCs) from conifer needles. *Pinus contorta* (Lodgepole Pine) and *Abies concolor* (White Fir) needles were collected from Sequoia National Park and stored at -15 to -20° C in a double layer of aluminum foil until extraction. Labeled surrogates were added at the beginning of the process to quantitate loss across the method. Needles were dried with Na₂SO₄, and extracted using accelerated solvent extraction (ASE) with dichloromethane (DCM) at 1500 psi and 120°C. Polar, organic interferences were removed from the extract by extraction with water. The resulting DCM fraction was solvent exchanged to hexane and purified by silica adsorption chromatography with a 20 g silica column, eluting target analytes in separate fractions using hexane, DCM, and ethyl acetate. Eluted fractions were combined, and purified by gel permeation chromatography (GPC), to reduce interferences present in the extract. Extracts were screened for interferences using gas chromatography coupled to a flame ionization detector and analyzed using gas chromatography coupled to mass spectrometry (GC/MS) with electron impact ionization (EI) and electron capture negative ionization (ECNI). Final method was used to analyze SOCs in conifer needles taken from Sequoia National Park.